[0052] FIG. 27 is a schematic diagram showing a CCD array in which some of the pixels can be coated with a filtering material that passes only the spatial wavelengths relating to shape while other pixels pass only the desired wavelengths related to color;

[0053] FIG. 28 is a schematic diagram of a first exemplary embodiment of the three-dimensional calibration equipment depicted in FIG. 1, in which the three-dimensional calibration equipment includes a light source, a holographic calibration plate, and two or more optical recorders;

[0054] FIG. 29 is a perspective view of a cubical virtual calibration pattern in the form of a "tinker toy" like grid projected by a holographic calibration plate in the vicinity of a desired object;

[0055] FIG. 30 is a perspective view of a cubical virtual calibration pattern of FIG. 29 in which individual intersections of the grid of the virtual calibration pattern are labeled with numerals;

[0056] FIG. 31 is a perspective view of a cubical virtual calibration pattern of FIG. 29 in which individual intersections of the grid of the virtual calibration pattern are labeled with bar codes;

[0057] FIG. 32 is a schematic diagram showing how different calibration wavelengths can produce different grids for the virtual calibration pattern of varying density around the desired object, in this case a grid of low density;

[0058] FIG. 33 is similar to FIG. 32 in which the grid is of medium and high density;

[0059] FIG. 34 is a schematic diagram of a second exemplary embodiment of the three-dimensional calibration equipment depicted in FIGS. 1 and 28, in which a mirror is placed in the field of view of the optical recorders;

[0060] FIG. 35 is a block diagram depicted the optics/electronics/software for use with the embodiments of FIGS. 28 and 34;

[0061] FIG. 36 is a schematic diagram of a third exemplary embodiment of the three-dimensional calibration equipment depicted in FIGS. 1 and 28, in which the three-dimensional calibration equipment also includes an optical or mechanical shutter;

[0062] FIG. 37 is a flow chart depicting the method of calibration to be used in conjunction with the embodiments of the three-dimensional calibration equipment depicted in FIGS. 28, 34, and 36;

[0063] FIG. 38 is a schematic diagram of a variation of the embodiment of FIG. 28 in which the desired object has affixed to it calibration points which are painted with or reflective of the calibration wavelengths which are captured separately in the optical recorders;

[0064] FIG. 39 is a schematic diagram showing an optical recorder located outside of the cylindrical holographic calibration plate, a position from which the optical recorder views a cylindrical virtual calibration pattern in its field of view;

[0065] FIG. 40 is a schematic diagram showing an optical recorder located inside a spherical holographic calibration plate from which position a part of the spherical calibration grid is observable;

[0066] FIG. 41 is a schematic diagram of a fourth exemplary embodiment of the three-dimensional calibration equipment depicted in FIGS. 1 and 28, which includes three optical sources, a holographic calibration plate with an excitation source, and a laser pointer or laser ranging measurement device;

[0067] FIG. 42 is a flow chart depicting the method of calibration to be used in conjunction with the embodiment of the three-dimensional calibration equipment depicted in FIGS. 41;

[0068] FIG. 43 is a schematic diagram of a fifth exemplary embodiment of the three-dimensional calibration equipment depicted in FIGS. 1 and 28, in which the three-dimensional calibration equipment employs non-continuous, identical holographic calibration plates instead of a single continuous holographic calibration plate;

[0069] FIG. 44 is a flow chart depicting the method of calibration to be used in conjunction with the embodiment of the three-dimensional calibration equipment depicted in FIGS. 43;

[0070] FIG. 45 is a schematic diagram of a sixth exemplary embodiment of the three-dimensional calibration equipment depicted in FIGS. 1 and 43, in which the three-dimensional calibration equipment also includes reference points identified by the calibration equipment in the field of view of the desired object;

[0071] FIG. 46 is a schematic diagram of a seventh exemplary embodiment of the three-dimensional calibration equipment depicted in FIGS. 1 and 44, in which the three-dimensional calibration equipment does not utilize fixed calibration plate(s);

[0072] FIG. 47 is a schematic diagram of an eighth exemplary embodiment of the three-dimensional calibration equipment depicted in FIGS. 1 and 28, in which the three-dimensional calibration equipment also includes a band stop filter;

[0073] FIG. 48 is a schematic diagram of a ninth exemplary embodiment of the three-dimensional calibration equipment depicted in FIG. 1, in which the three-dimensional calibration equipment is used in conjunction with a stereoscopic microscope; and

[0074] FIG. 49 is a schematic diagram of a ninth exemplary embodiment of the three-dimensional calibration equipment depicted in FIGS. 1 and 28, in which the three-dimensional calibration equipment also includes a desired object imprinted on a plate in which the desired object is identified using a combination of characteristics.

DETAILED DESCRIPTION OF THE INVENTION

[0075] With reference to FIG. 1, a block diagram of a complete three-dimensional imaging system 10 is depicted. The three-dimensional imaging system 10 includes a three-dimensional display 12, a three-dimensional image scanning device 14, and/or one or more two-dimensional image scanning devices 15, and three-dimensional calibration equipment 16. The three-dimensional image scanning device 14 and/or the two-dimensional image scanning device 15 are employed to generate a three-dimensional image (not shown) to be displayed on the three-dimensional display 12, and to provide data for use by the three-dimensional calibration equipment 16. The three-dimensional calibration equipment 16 calibrates the three-dimensional image scanning device 14 and/or the two-dimensional image scanning device 15. The three-dimensional display 12 and the three-dimensional image scanning device 14 both employ optical pulses and non-linear optics (not shown) to display and record, respectively, a three-dimensional image.

[0076] For the purposes of the discussion below, "voxels" are volume pixels, the smallest distinguishable three-dimen-